1. Check registration pin and film transport claw for excessive play.

   Hold registration pin with pair of tweezers and check for play from side to side. There should be no play at all on the registration pin.

2. In the same manner check film transport claw. The transport claw is allowed to have some play but it should not be more than approximately 0.02mm. In case of too much play, either the guide roller in the transport cam, p/n D-2, is worn out and must be replaced or claw holder assembly can be loose or worn out. Tighten universal joint if loose or exchange part.

3. Check if registration pin and transport claw work in proper relation to each other. At the same moment the registration pin begins to move into the perforation, the transport claw must begin to move out of its perforation.

4. Check registration pin action. The registration action should move the film approximately 0.03mm in running direction. This can only be checked with standard steel test film on a high powered magnifier or Shadowgraph.

5. Checking frame line:

   The frame line should be exactly in the center of each perforation hole. If the frame line is off, the whole transport and registration action has to be moved in the required direction.

6. Timing of mirror-shutter:

   The proper relation between shutter and transport claw movement is achieved by precise engaging of the mirror-shutter shaft gear, p/n D-32, and the intermittent shaft gear, p/n D-6. If either of these gear units have been removed during repair, special attention must be given upon reassembly to re-establish exact timing position. Adjustment can be made by changing position of mirror-shaft gear, p/n D-32, or disengaging and re-inserting shaft-gear in different position (either to right or left, as required.)

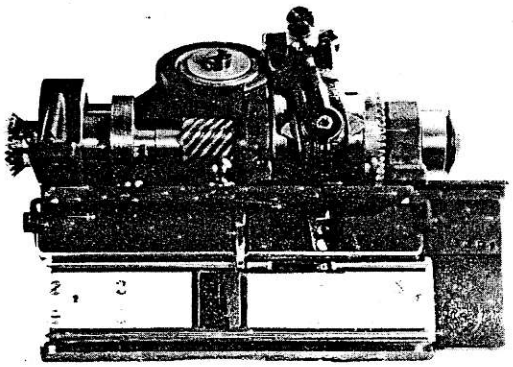


Fig. 12

7. Checking and mounting of mirror-shutter:

The mirror-shutter, made of solid glass, is ground optically flat and metal coated. The mirror, mounted on the flange shaft, must run true in a tolerance of .002mm. If this tolerance is not maintained, the image transmitted from the mirror into the viewfinder system will appear to move. This movement would be most noticeable when viewing objects made up of straight lines, such as poles, window frames, etc.

Do not remove mirror-shutter unless mirror must be replaced, or repairs are necessary on the shutter bearing assembly.

Removal of mirror: To remove mirror-shutter, use spanner wrench, tool # K-61, and remove screw, p/n D-43, and felt washer. Carefully remove shutter from flange. Do not touch mirror surface with fingers and carefully protect the surface at all times.

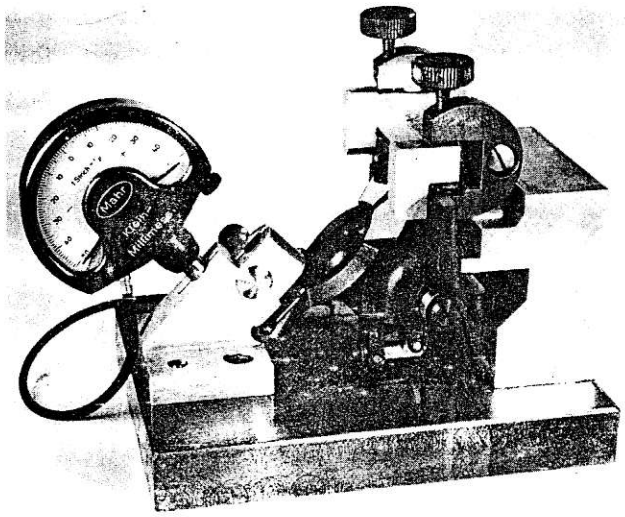
Installation of mirror-shutter: Before placing mirror on shaft, be sure mating surfaces are absolutely clean. Place shutter on flange, put felt washer on mirror and fasten with screw. Exert the utmost care and use judgement in tightening the screw, as too much pressure on the mirror can break it.

The edges of the mirror should be painted to prevent reflections on to the film.

Checking: To check if mirror-shutter rotates in a true single plane, a special fixture with dial indicator is used. For minor corrections in maintaining tolerance, gold leaf should be applied between mirror and flange.

Suggestions: If necessary equipment for mirror installation and checking is not available, send the mirror-shutter, flange and bearing assembly with bearing housing, as illustrated to our service department.

Fig. 13



(Figure 13 shows special checking fixture for mirror mounting.)

8. Checking film pressure plate:

Remove pressure plate from hinged door and use straight edge to check if pressure plate is flat. If pressure plate is slightly bowed or warped the pressure plate can be straightened by bending or twisting slightly. The recessed frame in center of pressure plate should be repainted if necessary. Use flat black paint, such as Flo-Paque or Kodak Brushing Lacquer.

9. Checking spring tension on film pressure plate:

To check spring tension, pressure plate must be replaced on hinged door. Use spring tension gauge tool #K-55. Apply tension gauge to center of film pressure plate. When enough pressure has been exerted to bring the tension scale up to 90 grams, the film pressure plate should give.

If film pressure plate tension is too high or low, the spring tension can be decreased or increased by bending leaf spring on back of pressure plate.

10. Checking side pressure rail:

Check side pressure rail in same manner. Pressure rail should give when dial on gauge reads about 40 grams. If pressure is too high, stretch springs. If pressure is too low, install new springs.

CLEANING AND LUBRICATION OF CAMERA MECHANISM PLATE ASSEMBLY B

Remove all gears and clean with cleaning fluid. When removing gear, p/n B-10, watch out for spring which is located in the center of the gear stud (see fig. 14.)

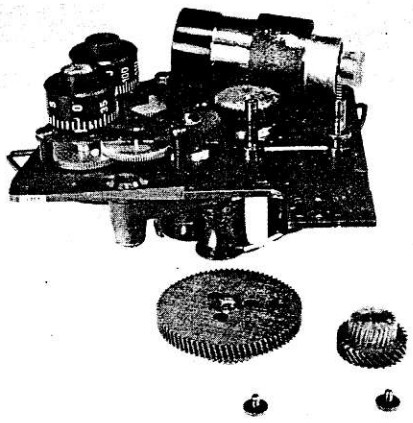


Fig. 14

Pay special attention to all the metal gears of the counter mechanism. These gears must be checked manually for smooth operation. Turn gear, p/n B-9, which is connected to the counter gear set until all gears of the counter mechanism make one full revolution. Pay special attention to foreign particles in the gear set. If completely clean, gear-set will move smoothly.

If gear-set must be disassembled, remove footage counter drum and frame counter drum. Use socket head wrench, #K-67. Also remove brass bushing with pins.

Remove screws, p/n B-8, from small assembly plate, p/n B-6. Now the small assembly plate and all the gears can be removed.

The complete counter gear assembly also must be removed if it is necessary to remove the sprocket gear-shaft, p/n B-9.

Note: Be careful not to use any strong cleaning fluid for the feet and frame counter drums. Clean only dry or with lens cleaner. Feet and frame drums may be damaged or destroyed by solvents.

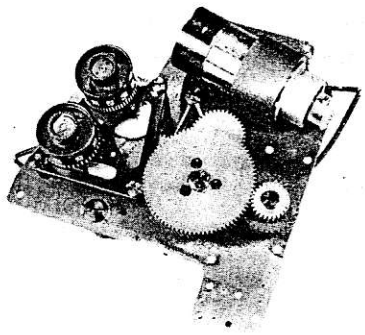


Fig. 15

CHECKING FILM ROLLER GUIDE ARM, P/N B-58

The film roller guide arm, when in closed position, must exert enough pressure to prevent the film from slipping over the sprockets when camera is running. If the spring tension of the guide arm is too weak, the coil spring, p/n B-60, which is incorporated in the guide arm axle, must be tightened.

The distance between roller guide arm and film sprockets in closed position should be approximately two black and white film thicknesses or a little less. If the distance between roller guides and sprockets is too great, the film also can climb over the sprockets. If the roller guide arm is too close to the film sprockets, p/n B-26, the film will get scratched in the perforation area.

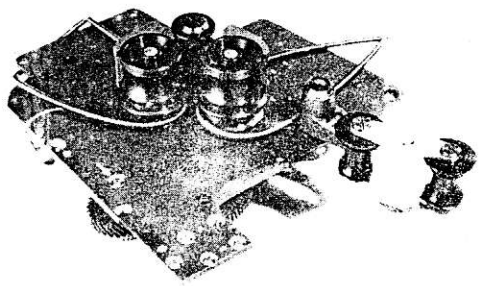


Fig. 16

If adjustment is necessary, the lock spring, p/n B-64, which is mounted to the mechanism plate and located directly under the roller guide arm, must be moved accordingly either forward or backward. To reach the screw head, which holds this lock spring it is necessary to remove the film sprockets, p/n B-26.

TACHOMETER

The Tachometer as a unit should not be disassembled. If defective - exchange.

If a new tachometer must be installed or the gear of the tachometer must be exchanged, the mirror-shutter transport assembly, p/n D-100, and the mechanism plate assembly B, should be mounted together outside of the camera housing to set the tachometer or the tachometer gear in such a position that it has proper play to the engaging gear of p/n D-100. See fig. 17.

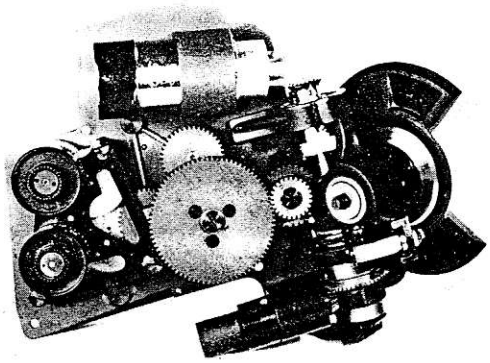


Fig. 17

Mounting camera mechanism plate together with mirror-shutter and film transport assembly outside of the camera is recommended in the course of any repair as a way of checking all gears for proper engagement and play.

REPLACEMENT OF RUBBER COUPLING

The rubber coupling, p/n B-82, connects motor-shaft with camera drive. To prevent slippage between the motor-shaft and rubber coupling, the rubber should be kept clean from oil and grease. If the rubber is aged or shows wear and tear, it should be replaced. Use tool #K-66 and remove nut in center of rubber. See fig. 18

Remove old rubber. Watch out for two metal segments, which may remain in the old rubber tube. The two metal segments are needed to fasten the new rubber tube.

Insert new rubber coupling over center-shaft. Place metal segments around tapered shaft in such a way that the two segments form a closed ring.

Replace nut and tighten firmly. While doing so, the two metal segments are pressed against the walls of the rubber, inside, and thus the rubber is kept tight.

Note: New cameras with serial numbers above #12001 or #0331 have motor coupling attached to shutter mechanism plate. (See fig. 19.)

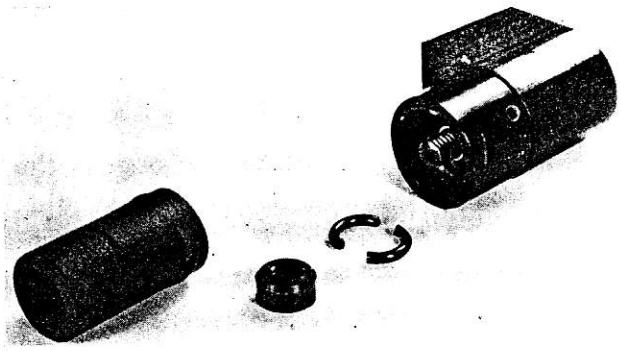


Fig. 18

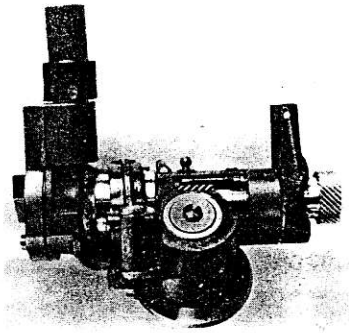


Fig. 19

REASSEMBLY OF CAMERA

The camera should be reassembled in the same order as it was disassembled. Some hints, however, might be helpful for doing so.

1. On cameras with serial numbers below #5751, prism holder must be inserted into the camera housing first.

   For cameras with serial numbers above #5751, the prism holder is attached to the shutter mechanism.

2. Carefully place the mirror-shutter assembly into camera housing and fasten it with two screws from the front. NOTE: Screws should not be tightened at this moment.

3. Hold camera housing and mirror-shutter assembly in left hand and place mechanism plate B in the same fashion as it was disassembled on removal.

   Connect mechanism plate with mirror-shutter assembly. Be sure to use the proper screws.

4. After mirror-shutter assembly and film mechanism plate are back in place, tighten all screws and then check flange focal distance, as described on page

5. In case the flange focal distance is slightly out of tolerance, small correction can be made. Loosen only the screws which hold the mechanism plate on the camera housing. Then, move the mechanism plate and mirror-shutter assemblies, forward or backward, as required to bring the flange focal distance into acceptable limits. Refer to page 23

Continue assembly as follows:

6. Motor-drive coupling
7. Friction Assembly and Drive-belt
8. Cover plate
9. Velvet cover plate
10. Switch
11. Pressure Plate

MEASURING FLANGE FOCAL DISTANCE

To obtain perfect focus and as a result, sharp pictures, the flange focal distance must be kept strictly in tolerance.

For measuring this distance, the following measuring tools are used:

T 35-1	Depth gauge with special flange
T 35-2	Gauge block 52mm
K-53	Plate for aperture

First place gauge block on piece of flat ground stock, put dial indicator on top and set dial indicator scale on zero. See fig. 20

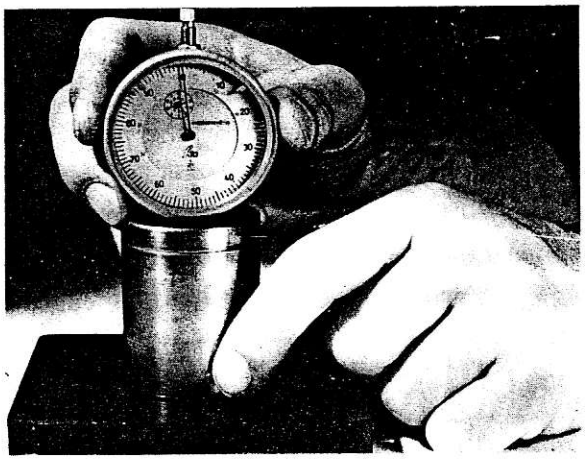


Fig. 20

Hold parallel steel plate K-53 firmly against film aperture plate, and place depth gauge into open lens socket. Make sure matching surfaces of dial and lens socket are clean. Make sure mirror-shutter is in open position. The depth gauge should now read:

52mm - 0.02

See fig. 21-22

Fig. 21

Fig. 22

Since all lenses used on Arriflex cameras are adjusted for exactly 52mm, the question may arise as to why the distance from the turret surface to the film aperture should be 52mm -0.02. The reason for the minus tolerance is based on the fact that most film is not perfectly flat during motion. The film tends to curve slightly away from the lens. The degree of curvature may vary depending on the type and age of the film. By compensating for this curvature, maximum sharpness will be obtained.

LENS TURRET

GENERAL:

The lens turret casting is seated in a brass bearing insert ring which is mounted into the camera housing. The turret itself is held in place by the turret center screw connected to center stud.

REMOVAL:

First remove center screw, p/n A-29 with Washer, p/n A-30. Turret can now be taken off camera housing.

IMPORTANT:

Remove turret slowly and carefully so that the spring loaded locking roller assemblies do not fly out. There are three locking roller assemblies incorporated in the turret. Each locking roller assembly consists of turret indexing wheel, p/n F-16, turret indexing plunger, p/n F-17, and compression spring, p/n F-15.

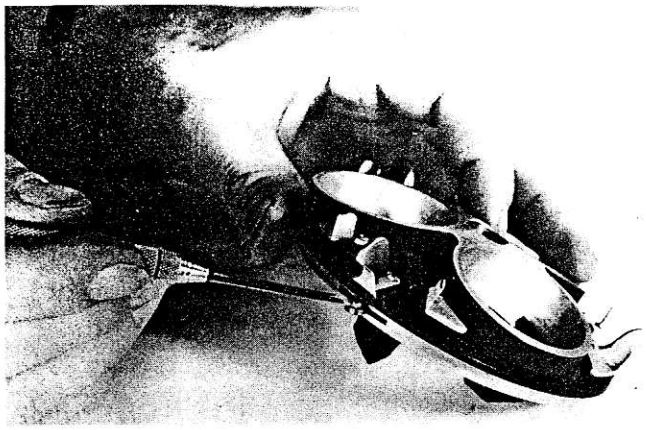


Fig. 25

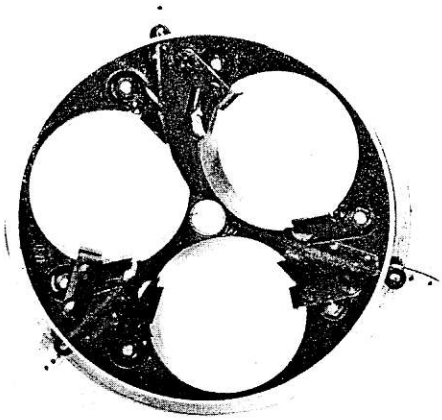


Fig. 26

SUGGESTION:

To prevent the rollers from jumping out when turret is being removed, simply put a towel around the turret to prevent loss of spring loaded locking assemblies.

REASSEMBLY:

Clean and lubricate mating surfaces of turret and camera housing, using special Arri grease. Insert compression springs, turret indexing plunger and turret indexing wheels. Make sure each locking assembly moves freely in its groove in the turret casting. Press against each unit with soft metal such as brass or bronze.

The turret can now be put on the camera housing. It will rest on its three extending rollers. In order to seat the turret completely into the brass bushing, the three rollers have to be pushed in simultaneously with soft metal. Pressure on the turret will then snap it securely into place. This is a trickly manuever for the inexperienced, and an assistant should be available. See fig. 25.

Fasten the center screws and check the turret for smooth revolving. Also check for excessive play between turret and housing. In case of too much play, shorten center stud accordingly. If the stud is too short and the turret fits too tightly, compensate with washer between screw and stud. Before inserting the lenses, lubricate the inside walls of the lens sockets with a thin layer of Arriflex grease.

REPLACEMENT:

In case a damaged turret casting must be replaced, the new casting may require machining to achieve the required distance between the lens mount seat and film plate.

LENS SEATING

The construction of the focusing mounts of Arriflex lenses varies with each manufacturer, model, focal length, etc., etc. and cannot be detailed here. However all Arriflex lenses are positioned in their focusing mounts to meet the requirements of a flange-to-film distance of 52mm (2.0472 inches.) This should be made as precise as possible, well within ± .01mm.

Whenever an Arriflex outfit is shop inspected or serviced, each lens must be individually checked to make sure it is precisely seated in its mount. For this, a quality Collimator is a "must" and a good reflex Collimator is recommended for its convenience and accuracy. (See illustration.) The Collimator must be equipped with a well made adapter for Arriflex lenses and a micrometer mechanism for the precise measurement of lens seating. Such a reflex Collimator also makes it possible to check the whole camera-and-lens system. It permits the technician to check focus right on the film itself with the camera running or still. When all adjustments related to focus and performance have been individually verified, this makes a good final check.

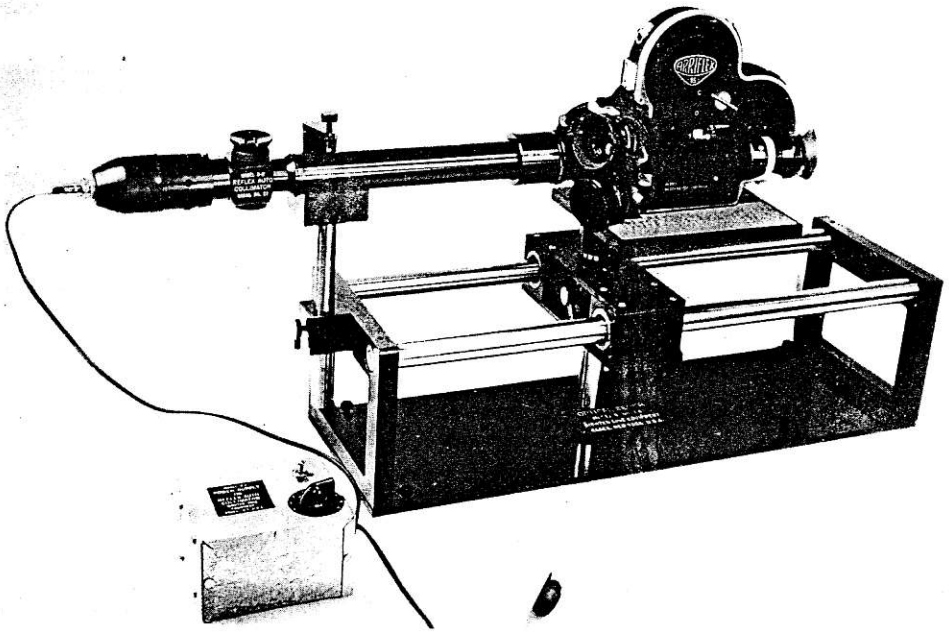


Fig. 23

CHECKING AND ADJUSTING OF VIEWFINDER

After camera is completely assembled, check viewfinder system for maximum sharpness.

Insert medium focal length lens (25mm) and set lens at infinity position. Focus camera at object, approximately 500 yards away (preferably flag-post, or antenna, etc.) If maximum sharpness cannot be obtained, with lens set at infinity position, the viewfinder tube, as a

unit, must be brought forward or backward. If such an adjustment is necessary, a lock-screw on the inside of the camera door must be loosened; then the viewfinder tube can be screwed forward or backward. In case the finder-tube has to come forward, the distance spacer between finder tube and camera housing must be machined down. In case the finder tube has to come forward, the distance spacer between finder tube and camera housing must be machined down. In case the finder tube has to be brought back, a thicker spacer ring must be inserted. On older models the finder-tube is just pushed forward or backward, and then locked into position with a lock screw on the inside of the camera door.

The viewfinder system should also be double-checked at short distance against distance scale.

Distance scales on lenses are not as accurate as the reflex viewing system. Do not use them for test focusing or critical close-ups.

SERVICING THE BUCKLE-SWITCH

1. Remove switch assembly, (fig. 30) as described on page 11

2. Check micro switch for proper switch action. Make sure red push button (A) is all the way out when switch is in ON position (B.) (Fig. 31.)

3. Trip buckle switch - now the long spring arm should be adjusted so that it keeps the micro switch in the OFF position, (B.) (Fig. 32.) The set screw will stop the spring tension arm in the desired position.

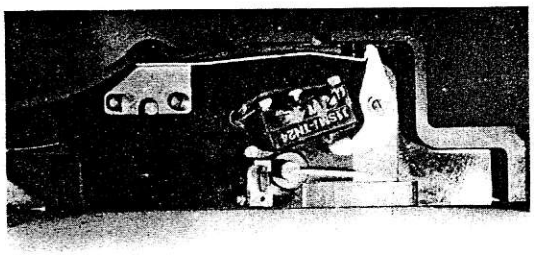


Fig. 30

Fig. 31

Fig. 32

This adjustment can also be made by moving the micro switch further up or down. When switch assembly is mounted back into camera housing, set the buckle switch and tap with your hand against the camera base. If the buckle switch trips off, it has to be readjusted for higher tension. This should be done by bending the end of the long spring arm slightly up or down.

SWITCH MECHANISM ON CAMERA DOOR

The mechanical parts of the camera's ON and OFF switch are incorporated in the camera door, whereas the switch is a unit in the camera body.

CHECKING OF SWITCH MECHANISM:

When switch lever, p/n K-21 is pressed down (slowly) the camera should start just before the switch locking lever, p/n K-19 snaps into locking position. If adjustment is necessary, unscrew switch plunger from switch trigger assembly and put small spacer such as a small steel ball between p/n K-22 and plunger, p/n K-24. This adjustment is mainly necessary if a new plunger must be installed.

If the trigger assembly does not release freely or is stuck the plunger, p/n K-24 must be exchanged, and repositioned as explained above.

8 VOLT DC VARIABLE SPEED MOTOR

REMOVAL OF RHEOSTAT HOUSING:

1. Remove screw, p/n H-12 from center of inching knob, p/n H-13. Inching knob can now be pulled out from motor shaft.
2. Remove motor direction knob, p/n H-1 (4 screws.)
3. Remove retaining clip. Use special pliers, tool #K-71.
4. Remove spring washer.
5. Remove rear cover plate, p/n H-19, by turning counter-clockwise.
6. Rheostat control cover, p/n H-23, can now be removed. Be careful not to bend contacts, p/n H-27.

All accessible parts can now be checked and cleaned.

See fig. 24A-24B-24C Page 29

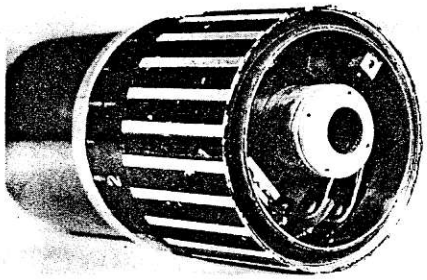


Fig. 24A

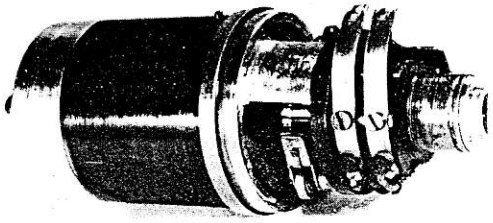


Fig. 24B

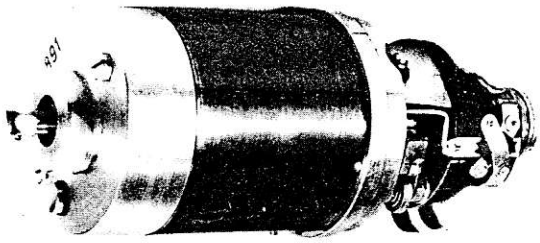


Fig. 24C

REPLACING RHEOSTAT:

If rheostat is defective or burned out, pull out brass resistance guide, p/n H-21, with rheostat, p/n H-22. This unit comes off together.

When new rheostat is installed, make sure insulation strip, p/n H-17, and insulation disc, p/n H-16, is put in place first. Connect wires from rheostat to resistance guide, p/n H-21, and insert into resistance control cover, p/n H-23. ONCE AGAIN: One contact has to make contact only with the resistor winding, while the other contact arm has to make contact only with the brass resistance guide.

Clean commutator of motor.

Check brushes of motor for right tension. (40 grams.)

400 FT. MAGAZINE

Since the 400 ft. magazine operates without any clutch systems or belt drive, very little mechanical attention is needed, besides cleaning and lubrication. The most important part of checking should be applied to the electrical contacts and connections.

CHECKING OF ELECTRICAL CONTACTS:

First check electrical contacts from camera body to magazine. On top of the camera body is a silver contact which has to make proper contact to the spring loaded silver contact of the magazine when magazine is attached to camera. It is important that the surfaces of these silver contacts are always clean. Also check if the spring loaded contact from the

magazine exerts enough pressure to make proper contact to the camera housing. Check contact bridge, p/n L-49. This part must be electrically insulated from the magazine body which is achieved by a plastic strip and a plastic bushing being connected to the magazine. The contact bridge must also exert enough pressure to make proper contact to Torque Motor when attached to magazine.

The two silver contacts which represent the ground line between magazine and Torque Motor must also be checked for proper contact.

The latest Torque Motors are equipped with an additional direct ground connection by inserting an extra cable (minus line) from the battery cable.

REMOVAL OF MAGAZINE THROAT AND LOCK ASSEMBLY P/N L-67:

Remove two screws, p/n L-53 and two screws, p/n L-54. Complete assembly can be removed from magazine body. See fig. 27

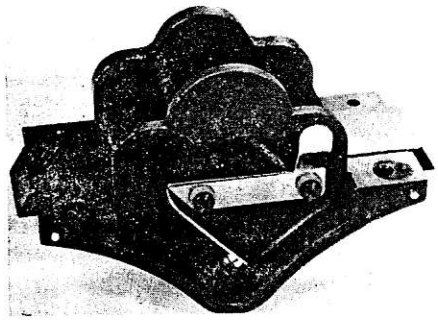


Fig. 27

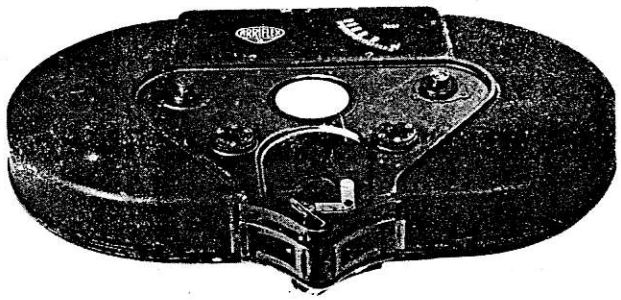


Fig. 28

DISASSEMBLY OF MAGAZINE THROAT:

Remove two locking plates, p/n L-42. Be careful not to lose silver contacts and springs which are incorporated between the moving locking plates and housing. The contacts with springs will jump out of place at the moment the locking plates are removed. There are two silver contacts (small and large) and one spring on each side.

If rollers, p/n L-43 and L-45 must be cleaned, changed or re-lubricated, remove special screws, p/n L-46 and p/n L-44.

CHANGING OF BALL BEARINGS OF TAKE-UP AND FEED ASSEMBLY:

Remove tapered pin from feed and take-up shaft. Push out shaft from ball bearing assembly. Ball bearings can now be cleaned or exchanged if necessary.

MAGAZINE DOOR:

Check proper fit of magazine door. Check door latches to see that they hold door securely closed.

TORQUE MOTOR

CHECKING, CLEANING AND LUBRICATION:

Remove back-cover with special pliers, #K-72.

Check if all gears move freely. Check and clean electrical contact points.

If Torque Motor needs complete overhaul, disassemble as follows:

Use spanner wrench, #K-67
Remove screws which hold knurled knobs
Left and right gears can now be removed, cleaned and relubricated

NOTE: The engaging gears are fastened by screws with left-thread, therefore these screws must be loosened in clockwise motion, contrary to all other screws.

Remove all other gears. Clean and relubricate.

Reassemble in same order.

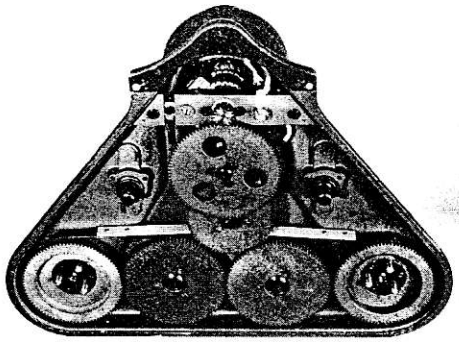


Fig. 29

NOTE: New type Torque Motors are now equipped with a torque limitor clutch to avoid damage to the motor during a film jam in the magazine. The clutch is mounted underneath the intermediate drive, (fig. 29.) The clutch should slip at a torque value of 270-300 grams. Adjustment can be made by either bending or replacing spring disc.

A64 50/166TR